MISCELLANEOUS REPORT NO. 27

LAKE STATES FOREST FIRE DAMAGE TABLES FOR YOUNG SECOND-GROWTH STANDS

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Forest fire damage statistics, to be of value, must be comparable from year to year and from unit to unit. This calls for a common policy and for uniform methods of damage appraisal. To this end, the various protection agencies in the Lake States met in conference, in 1938, and agreed to base damage estimates on current stumpage rates and to evaluate damage to sub-merchantable stands (both planted and natural) on the basis of present worth or their value when merchantable, discounted to their current age.

To simplify the computation involved, the Lake States Forest Experiment Station prepared tables for each major forest type showing the average damage per acre, based on size class, density of stocking, severity of burn, and average prevailing stumpage rates. In 1947 these tables were revised to reflect increased stumpage prices and to consider site, where data were available. Recently these tables have been again revised to permit the use of current local stumpage rates rather than arbitrary average stumpage values. The unit values given in the present tables represent the present worth, or value as an investment, of young second-growth, arrived at by discounting the average yield value of 5- to 9-inch stands to the average age of the smaller size classes recognized, using a uniform stumpage rate of $1 per cord and a discount rate of 5 percent compounded annually.

To determine the loss sustained in a given case, the unit value given in the table (for the type, site, size class, density of stocking, and severity of burn involved) is multiplied by the area burned and by the prevailing local stumpage price per cord of the species concerned. For example: If a medium-stocked 1- to 5-inch stand of good site jack pine is burned over by a light fire, the unit loss (from the table) would be $2.71 per acre. With a current local stumpage price of $3.50 per cord for jack pine and a burn of 15 acres, the estimated loss would be:

$2.71 x $3.50 x 15, or $142.28

1/ Maintained by the U. S. Department of Agriculture, Forest Service, in cooperation with the University of Minnesota, St. Paul Campus, St. Paul 1, Minnesota.

Explanation of Items Considered in the Tables

'o assist understanding of the damage tables the various items included re described briefly as follows:

Type.--The forest types listed are those most common in the Lake States and for the most part are readily identified. For practical considera-tions, minor variations should be ignored and only one type or set of conditions reported for a single fire unless more than 10 acres are involved.

Site.--Three site classes are recognized--good, medium, and poor. In general, site is indicated by height in relation to age or roughly to diameter. On good sites, for example, dominant and codominant trees will be taller for a given age or d.b.h. than on medium or poor sites. The average height for each size class and site is given in the table as a guide. Unless a site is definitely good or poor, it should be classed as medium. Extremely poor sites, off-site aspen for example, should be classed as non-forest.

Size.--Stands should be classified as to size on the basis of the average diameter at breast height (d.b.h.) of the codominant trees. The size classes recognized are reproduction (under 1 inch d.b.h.), second-growth or saplings (1 to 5 inches d.b.h.), and young-merchantable or poletimber (5 to 9 inches d.b.h.). Stands averaging over 9 inches d.b.h. are considered merchantable and should be appraised at their market or sale value. Scattered larger trees or an understory of small trees should be ignored unless sufficiently important to be appraised separately.

Density.--Stands are classified as to dnesity of stocking before burning as follows:

Good.--Area well stocked, over 70 percent of the growing space utilized.

Medium.--Area moderately stocked, trees somewhat widely spaced or bunched so that only 40 to 70 percent of the growing space is utilized.

Poor.--Only 10 to 40 percent of the growing space utilized by tree growth. Areas with only scattered trees or less than 10 percent stocked are usually classified as non-timbered.

Severity of burn.--Three degrees of severity of burn based on mortality are recognized. These are:

Light.--Less than one-third of the trees killed.

Moderate.--From 1/3 to 2/3 of the trees killed.

Severe.--More than two-thirds of the trees killed.

(Loss per acre = Table value x current local stumpage rate per cord)

Size class d.b.h.	Average dominant height	Good stocking: Light burn	Good stocking: Mod. burn	Good stocking: Severe burn	Medium stocking: Light burn	Medium stocking: Mod. burn	Medium stocking: Severe burn	Poor stocking: Light burn	Poor stocking: Mod. burn	Poor stocking: Severe burn
ASPEN-BIRCH										
				Good site						
Under 1"	16'	1.92	2.88	3.83	1.28	1.92	2.56	0.64	0.96	1.28
1-5"	42'	3.99	5.98	7.97	2.66	3.99	5.32	1.33	1.99	2.66
5-9"	68'	13.50	20.25	27.00	9.00	13.50	18.00	4.50	6.75	9.00
				Medium site						
Under 1"	15'	1.68	2.52	3.36	1.12	1.68	2.24	0.56	0.84	1.12
1-5"	40'	3.67	5.50	7.34	2.45	3.67	4.89	1.22	1.84	2.45
5-9"	64'	13.05	19.58	26.10	8.70	13.05	17.40	4.35	6.52	8.70
				Poor Site						
Under 1"	14'	1.40	2.10	2.80	0.93	1.40	1.87	0.47	0.70	0.93
1-5"	38'	3.06	4.59	6.12	2.04	3.06	4.08	1.02	1.53	2.04
5-9"	61'	12.60	18.90	25.20	8.40	12.60	16.80	4.20	6.30	8.40
JACK PINE										
				Good site						
Under 1"	7'	2.50	3.75	5.00	1.67	2.50	3.33	0.83	1.25	1.67
1-5"	22'	4.07	6.11	8.14	2.71	4.07	5.43	1.36	2.04	2.71
5-9"	49'	10.80	16.20	21.60	7.20	10.80	14.40	3.60	5.40	7.20
				Medium site						
Under 1"	6'	1.70	2.55	3.40	1.13	1.70	2.27	0.57	0.85	1.13
1-5"	20'	3.06	4.58	6.11	2.04	3.06	4.08	1.02	1.53	2.04
5-9"	47'	10.35	15.52	20.70	6.90	10.35	13.80	3.45	5.18	6.90
				Poor site						
Under 1"	5'	0.99	1.49	1.99	0.66	0.99	1.33	0.33	0.50	0.66
1-5"	17'	1.87	2.81	3.75	1.25	1.87	2.50	.62	.94	1.25
5-9"	44'	9.45	14.18	18.90	6.30	9.45	12.60	3.15	4.72	6.30

Size class d.b.h.	Average dominant height	Good stocking			Medium stocking			Poor stocking		
		Light burn	Mod. burn	Severe burn	Light burn	Mod. burn	Severe burn	Light burn	Mod. burn	Severe burn
NORTHERN HARDWOODS										
					Good site					
Under 1"	10'	2.65	3.98	5.30	1.77	2.65	3.54	0.88	1.33	1.77
1-5"	30'	4.76	7.14	9.52	3.17	4.76	6.35	1.59	2.38	3.17
5-9"	60'	14.62	21.94	29.25	9.75	14.62	19.50	4.88	7.31	9.75
					Medium site					
Under 1"	9'	1.55	2.33	3.10	1.04	1.55	2.07	0.52	0.78	1.04
1-5"	25'	3.39	5.08	6.78	2.26	3.39	4.52	1.13	1.70	2.26
5-9"	50'	13.95	20.92	27.90	9.30	13.95	18.60	4.65	6.98	9.30
					Poor site					
Under 1"	8'	0.76	1.14	1.52	0.51	0.76	1.01	0.25	0.38	0.51
1-5"	20'	2.11	3.17	4.23	1.41	2.11	2.82	.70	1.06	1.41
5-9"	40'	13.50	20.25	27.00	9.00	13.50	18.00	4.50	6.75	9.00
OAK										
					Good site					
Under 1"	13'	3.37	5.06	6.75	2.25	3.37	4.50	1.12	1.69	2.25
1-5"	27'	5.24	7.85	10.47	3.49	5.24	6.98	1.75	2.62	3.49
5-9"	49'	12.60	18.90	25.20	8.40	12.60	16.80	4.20	6.30	8.40
					Medium site					
Under 1"	12'	2.23	3.34	4.46	1.49	2.23	2.97	0.74	1.11	1.49
1-5"	24'	4.00	6.00	8.00	2.66	3.99	5.32	1.33	2.00	2.67
5-9"	39'	11.70	17.55	23.40	7.80	11.70	15.60	3.90	5.85	7.80
					Poor site					
Under 1"	10'	1.53	2.30	3.07	1.02	1.53	2.04	0.51	0.77	1.02
1-5"	18'	2.89	4.34	5.78	1.93	2.89	3.86	.96	1.45	1.93
5-9"	27'	10.80	16.20	21.60	7.20	10.80	14.40	3.60	5.40	7.20

(Loss per acre = Table value X current local stumpage rate per cord)

Size class d.b.h.	Average dominant height	Good stocking: Light burn	Good stocking: Mod. burn	Good stocking: Severe burn	Medium stocking: Light burn	Medium stocking: Mod. burn	Medium stocking: Severe burn	Poor stocking: Light burn	Poor stocking: Mod. burn	Poor stocking: Severe burn
RED PINE - Average site										
Under 1"	6'	2.07	3.11	4.14	1.38	2.07	2.76	0.69	1.04	1.38
1-5"	17'	3.72	5.58	7.44	2.48	3.72	4.96	1.24	1.86	2.48
5-9"	46'	12.60	18.90	25.20	8.40	12.60	16.80	4.20	6.30	8.40
WHITE PINE - Average site										
Under 1"	5'	3.51	5.26	7.02	2.34	3.51	4.68	1.17	1.75	2.34
1-5"	19'	6.30	9.45	12.60	4.20	6.30	8.40	2.10	3.15	4.20
5-9"	54'	19.35	29.02	38.70	12.90	19.35	25.80	6.45	9.68	12.90
SPRUCE-BALSAM FIR - Average site										
Under 1"		2.29	3.44	4.58	1.53	2.29	3.05	0.76	1.15	1.53
1-5"		5.25	7.87	10.50	3.50	5.25	7.00	1.75	2.62	3.50
5-9"		13.50	20.25	27.00	9.00	13.50	18.00	4.50	6.75	9.00
CONIFEROUS SWAMP - Average site										
Under 1"		0.79	1.18	1.58	0.53	0.79	1.05	0.26	0.40	0.53
1-5"		2.94	4.42	5.89	1.96	2.95	3.93	.98	1.47	1.96
5-9"		12.15	18.22	24.30	8.10	12.15	16.20	4.05	6.08	8.10
SWAMP HARDWOODS - Average site										
Under 1"		2.51	3.77	5.02	1.67	2.51	3.35	0.84	1.26	1.67
1-5"		4.30	6.44	8.59	2.86	4.30	5.73	1.43	2.15	2.86
5-9"		13.50	20.25	27.00	9.00	13.50	18.00	4.50	6.75	9.00
BOTTOMLAND HARDWOODS - Average site										
Under 1"		3.80	5.69	7.59	2.53	3.80	5.06	1.27	1.90	2.53
1-5"		5.89	8.84	11.78	3.93	5.89	7.85	1.96	2.95	3.93
5-9"		14.85	22.28	29.70	9.90	14.85	19.80	4.95	7.42	9.90